

REMARKS

Claims 1-10 are pending in the present application and are rejected.

Applicant's Response to Claim Rejections under 35 U.S.C. §103

Claims 1, 3, 4 and 6-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kusano (U.S. Patent No. 6,508,647) in view of Gleave et al. (U.S. Patent No. 4,105,715).

It is the position of the Office Action that Kusano '647 discloses the embodiment as claimed, with the exception of teaching (i) that the paste has a viscosity of 0.1 Pa·s to 5 Pa·s, and (ii) that the paste is thixotropic. The Office Action states that (i) would have been obvious, and relies on Gleave to teach (ii).

Gleave is directed at cyanoacrylate adhesive paste compositions. These compositions have thixotropic properties. As explained in the Examples, the composition must include (i) ethyl or methyl cyanoacrylate, and (ii) a filler which is one of polyvinylidene fluoride powder, polycarbonate, and polyethylene. The result is a paste or gel with thixotropic properties. It appears that the filler gives rise to the thixotropic property.

In response, Applicant respectfully submits that it would not have been obvious to combine Kusano '647 and Gleave. In particular, Applicant respectfully submits that it would not have been obvious to utilize the cyanoacrylate of Gleave in the system disclosed by Kusano. This is at least because cyanoacrylate polymerizes when it comes into contact with water. 2-cyanoacrylate (2-cyanoacrylic acid ester), the chief component of the adhesive of Gleave, includes a vinyl group ($-\text{CH}_2=\text{C}-$) and two strong electron attracting groups, a cyano group

($\text{-C}\equiv\text{N}$) and a carbonyl group (>C=O). Furthermore, 2-cyanoacrylate cures by anionic polymerization. Specifically, a negative ion (anion) is provided by a compound such as water (H_2O), methanol (CH_3OH), or sodium hydroxide (NaOH). In the molecular structure of these, the OH^- group reacts with cyanoacrylate, causing polymerization/curing. Typically, this can even occur with just the OH^- group of the small amount of water contained in the air.

Since cyanoacrylates such as 2-cyanoacrylate polymerize and cure in the presence of water, it would not have been obvious to modify Kusano '647 in order to include cyanoacrylate as a thixotropic paste. Gleave discloses that thixotropic properties of cyanoacrylate adhesive paste can be increased adding powdered organic filler to cyanoacrylate. Gleave also discloses improving the manipulability of the cyanoacrylate paste by changing it from its usual liquid state to a jelly, or by slightly delaying its curing. However, even if this improves manipulability, since the chief component of the paste is cyanoacrylate, it will cure/polymerize in the presence of OH^- from water, for example. The oral cavity is moister than the outside of the body and becomes moister with respiration. As such, the cyanoacrylate adhesive paste of Gleave will cure/polymerize quickly due to the moisture in the air or in a patient's oral cavity, and will not reach the target location. Furthermore, even if the cyanoacrylate reaches the target position, it will cure instantly when it reaches the target position. This is because there is blood/lymph fluid in the dental pulp or blood/effusion in the apical area/periodontal membrane area, and these add more moisture than the moisture which is already present in the oral cavity and air. Please see "The Practice of Root Canal Fixative Methods Using Calcium Hydroxide" by Yuichi Kimura et al., Foundation – Oral Health Association of Japan. Also, a cyanoacrylate adhesive paste would

harden after reaching the dental pulp from the carious cavity, the dental pulp/periodontal membrane area from a fracture line, or the apical area through the root canal. As such, the paste would harden to the point that it is impossible to clean it away. As such, a cyanoacrylate paste is problematic for this type of dental application. Therefore, for at least the above reasons, Applicant respectfully submits that it would not have been obvious to modify Kusano '647 by incorporating the thixotropic 2-cyanoacrylate paste of Gleave.

Furthermore, Applicant notes that the conductive ion paste of Kusano '647 is used as a highly alkali water soluble ion paste with pH typically between 11 and 12. Highly alkali water solubility means that the concentration of OH⁻ is increased. OH⁻ is an extremely important ion in root canal procedures in order to sterilize, suppress inflammation, stop hemorrhaging, contain effusion, dissolve surviving contaminants (organic matter), and so on. In light of this, the cyanoacrylate adhesive paste of Gleave is inadequate. Therefore, for at least the above reasons, Applicant respectfully submits that it would not have been obvious to modify Kusano '647 in view of Gleave as proposed. Favorable reconsideration is respectfully requested.

Claims 2 and 5 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kusano in view of Gleave and Caizza (U.S. Patent No. 5,964,737).

It is the position of the Office Action that the combination of Kusano and Gleave discloses the embodiments as claimed, with the exception of teaching a syringe having a discharge part made of silicon rubber. The Office Action relies on Caizza to provide this teaching.

In response, Applicant respectfully submits that claims 2 and 5 are patentable at least due to their dependency on claim 1, which Applicant submits are patentable for at least the above reasons. Favorable reconsideration is respectfully requested.

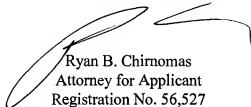
For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

If the Examiner deems that any further action by applicant would be desirable to place the application in condition for allowance, the Examiner is encouraged to telephone applicant's undersigned attorney.

If this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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Enclosures: (1) Declaration by Dr. Kazunori KUSANO
(2) "The Practice of Root Canal Fixative Methods Using Calcium Hydroxide" by Yuichi Kimura et al., Foundation – Oral Health Association of Japan.
(3) Partial English translation of "The Practice of Root Canal Fixative Methods Using Calcium Hydroxide"
(4) Verification of Translation